CLAIMS

1. A constant velocity universal joint including a hollow outer joint member (12) in which plural guide grooves (24) extending in an axial direction of the outer joint member (12) are formed in an inner peripheral surface, and which is connected to a first shaft (22); an inner joint member (14) which is connected to a second shaft (28), and which is housed in the outer joint member (12); plural leg shafts (30) provided in the inner joint member (14), each of which protrudes in a radial direction of the second shaft (28), and in each of which a convex sphere (30a) is formed in a tip portion; and a roller unit (15) including an inner roller (16) in which a concave sphere (16a) that is engaged with the convex sphere (30a) of each of the leg shafts (30) is formed in an inner peripheral surface, and an outer roller (18) which is housed in each of the guide grooves (24) of the outer joint member (12) so as to be slidable, the inner roller (16) and the outer roller (18) being movable with respect to each other in an axial direction of the inner roller (16) and the outer roller (18) through a rolling body (32), wherein each of the leg shafts (30) and the inner roller (16) can be oscillated with respect to each other, the constant velocity universal joint being characterized in that:

a cylindrical surface (18a) is formed in a radially outer surface of the outer roller (18); a flat engagement surface (24a) which is engaged with the cylindrical surface (18a) of the outer roller (18) is formed in a lateral surface of each of the guide grooves (24) of the outer joint member (12); and the cylindrical surface (18a) of the outer roller (18) satisfies following two equations,

$W1 > PCR(1 - \cos\theta)/2 + \mu_3 R3 + \mu_2 R1$

$W2 > 3PCR(1 - \cos\theta)/2 - \mu_3 R3 + \mu_2 R1$, wherein

W1 indicates a length in an axial direction of the cylindrical surface (18a) from a center (O_1) of the cylindrical surface (18a) in the axial direction to an end portion of the cylindrical surface (18a) on an outer peripheral side of the outer joint member (12);

W2 indicates a length in the axial direction of the cylindrical surface (18a) from the center (O_1) of the cylindrical surface (18a) in the axial direction to an end portion of the cylindrical surface (18a) on a joint center side of the outer joint member (12);

PCR indicates a distance from an axis of the inner joint member (14) to a center (O_2) of the convex sphere (30a) of each of the leg shafts (30);

θ indicates a required maximum joint angle;

R1 indicates a radius of the cylindrical surface (18a) of the outer roller (18);

R3 indicates a radius of the concave sphere (16a) of the inner roller (16);

μ_2 indicates a friction coefficient when the inner roller (16) is moved with respect to the outer roller (18) in an axial direction of the inner roller (16); and

μ_3 indicates a friction coefficient between the convex sphere (30a) of each of the leg shafts (30) and the concave sphere (16a) of the inner roller (16).

2. The constant velocity universal joint according to claim 1, characterized in that a taper surface (18b) whose diameter decreases toward an end portion is formed in each of axially both sides of the cylindrical surface (18a) of the outer roller (18), and a taper surface (24b, 24c) is formed in the lateral surface of each of the guide grooves (24) at a portion opposed to each taper surface (18b) of the outer roller (18), the taper surface (24b, 24c) formed in the lateral surface of each of the guide grooves (24) becoming closer to a plane including an axis of the outer roller (18) and an axis of the outer joint member (12) toward each of axially both sides of the outer roller (18).

3. The constant velocity universal joint according to claim 1 or 2, characterized in that a chamfer (40) that is a curved surface is formed on each of axially both sides of the cylindrical surface (18a) of the outer roller (18).

4. The constant velocity universal joint according to claim 3, characterized in that a concave curved surface (42) is formed in the lateral surface of each of the guide grooves (24) at a portion opposed to each chamfer (40) of the outer roller (18).

5. The constant velocity universal joint according to claim 1, characterized in that a taper surface (18b) whose diameter decreases toward an end portion is formed in each of axially both sides of the cylindrical surface (18a) of the outer roller (18), and a convex curved surface (44) which protrudes toward an inner side of the outer joint member (12) is formed in the lateral surface of each of the guide grooves (24) at a portion opposed to each taper surface (18b) of the outer roller (18).